

## Claims

- [c1] A downhole drilling tool for drilling a wellbore into an earth formation, the drilling tool having a drill string with a drill bit at an end thereof, the downhole drilling tool comprising:
- a drill collar connectable to the drill string;
  - a housing positionable within the drill collar;
  - a gyroscope sealably positionable within the housing; and
  - at least one centralizer positionable between the housing and the drill collar
- whereby the housing is supported in the drill collar.
- [c2] The downhole drilling tool of claim 1, wherein at least one centralizer is an endcap adapted to support an end of the housing in the drill collar.
- [c3] The downhole drilling tool of claim 2, further comprising an alignment pin extending through the end cap and the drill collar.
- [c4] The downhole drilling tool of claim 2, wherein the housing has an opening at a first end thereof, and wherein the tool further comprises a plug removably positionable within the opening.
- [c5] The downhole drilling tool of claim 4, wherein the plug has an alignment rod extending therefrom, the alignment rod positionable adjacent the gyro.
- [c6] The downhole drilling tool of claim 5, wherein advancement of the plug into the opening applies a compressive force to the gyro via the alignment rod.
- [c7] The downhole drilling tool of claim 6, wherein the housing has a second end, and wherein the tool further comprises a compression rod disposable adjacent the gyro at the second end of the housing.
- [c8] The downhole drilling tool of claim 7, wherein advancement of the plug into the opening applies a compressive force to the gyro via the compression rod.
- [c9] The downhole drilling tool of claim 7, wherein the compression rod is adapted for connection to a telemetry device.

- [c10] The downhole drilling tool of claim 9, further comprising a telemetry device positioned in the drill string, the telemetry device connectable to the gyro via the compression rod and capable of transmitting signals between the downhole tool and a surface communication unit.
- [c11] The downhole drilling tool of claim 10, wherein the telemetry device is a Powerpulse unit.
- [c12] The downhole drilling tool of claim 1, wherein the at least one centralizer comprises an outer ring, an inner ring and a plurality of struts therebetween.
- [c13] The apparatus of claim 1 further comprising a load mechanism comprising a spring loaded collar, the loading mechanism positionable in the drill collar between the housing and an end of the drill string such that advancement of the drill string into the drill collar applies a compressive force to the housing via the loading mechanism whereby the housing is secured within the drill collar.
- [c14] An apparatus for supporting a gyroscope in a drill collar of a drill string, the drill string forming at least a portion of a downhole drilling tool, the apparatus comprising:  
a housing adapted to receive a gyroscope, the housing sealingly positionable within the drill collar; and  
at least one centralizer for supporting the housing within the drill collar whereby the gyroscope is protected from downhole conditions.
- [c15] The apparatus of claim 14, wherein at least one centralizer is an endcap adapted to support an end of the housing in the drill collar.
- [c16] The apparatus of claim 15, further comprising an alignment pin extending through the end cap and the drill collar.
- [c17] The apparatus of claim 15, wherein the housing has an opening at a first end thereof, and wherein the tool further comprises a plug removably positionable within the opening.
- [c18] The apparatus of claim 17, wherein the plug has an alignment rod extending therefrom, the alignment rod positionable adjacent the gyro.

- [c19]      The apparatus of claim 18, wherein advancement of the plug into the opening applies a compressive force to the gyro via the alignment rod.
  
- [c20]      The apparatus of claim 19, wherein the housing has a second end, and wherein the tool further comprises a compression rod disposable adjacent the gyro at the second end of the housing.
  
- [c21]      The apparatus of claim 20, wherein advancement of the plug into the opening applies a compressive force to the gyro via the compression rod.
  
- [c22]      The apparatus of claim 20, wherein the compression rod is adapted for connection to a telemetry device.
  
- [c23]      The apparatus of claim 22, further comprising a telemetry device positioned in the drill string, the telemetry device connectable to the gyro via the compression rod and capable of transmitting signals between the downhole tool and a surface communication unit.
  
- [c24]      The apparatus of claim 23, wherein the telemetry device is a Powerpulse unit.
  
- [c25]      The apparatus of claim 14, wherein the at least one centralizer comprises an outer ring, an inner ring and a plurality of struts therebetween.
  
- [c26]      The apparatus of claim 14 further comprising a load mechanism comprising a spring loaded collar, the loading mechanism positionable in the drill collar between the housing and an end of the drill string such that advancement of the drill string into the drill collar applies a compressive force to the housing via the loading mechanism whereby the housing is secured within the drill collar.
  
- [c27]      An apparatus for supporting a gyroscope in a drill collar of a downhole drilling tool, comprising:
  - a housing adapted to receive a gyroscope, the housing positionable within a drill collar;
  - at least one centralizer for supporting the housing within the drill collar;
  - a downhole end cap;
  - an uphole end cap; and
  - a gyro compression mechanism capable of providing axial support for the

gyroscope.

- [c28] The apparatus of claim 27 further comprising a loading device capable of retaining the housing inside the drill collar.
- [c29] A method of supporting a gyroscope within a drill collar of a downhole drilling tool, comprising:  
positioning a gyroscope within a housing in a drill collar;  
inserting a plug into a downhole end of the housing; and  
securing the gyroscope into the housing by applying axial compression to the gyroscope and locking the downhole end of the gyroscope in place.
- [c30] A method of supporting a gyroscope within a drill collar of a downhole drilling tool, the drilling tool comprising a drill string connectable to the drill collar, the method comprising:  
inserting a gyroscope into a housing between a first compression rod and a second compression rod, the first compression rod seated against an end of the housing;  
positioning the housing within the drill collar; and  
applying a compressive force to the gyroscope by advancing a plug into the housing adjacent the second compression rod whereby the gyroscope is compressed between the compression rods.
- [c31] The method of claim 30, further comprising securing the housing within the drill collar by applying a compressive force to the housing within the drill string.
- [c32] The method of claim 30, further comprising supporting the housing within the drill collar with one or more centralizers.